MICHIGAN DEPARTMENT OF NATURAL RESOURCES
FISHERIES DIVISION

STATUS OF THE FISHERIES

IN MICHIGAN WATERS OF

LAKE ERIE AND LAKE ST. CLAIR

2005

Lake St. Clair yellow perch caught in assessment trawl, September 2005

Michael Thomas and Robert Haas
Lake St. Clair Fisheries Research Station
Website: http://www.michigan.gov/dnr/0,1607,7-153-10364_10951_11304---,00.html

Prepared for the GLFC Lake Erie Committee Meeting
Windsor, Ontario
March 20, 2006

Highlights for 2005

The purpose of this report is to provide an update on the status of the fisheries in the Great Lakes and connecting waters of southeast Michigan. Sources of information used in compiling this report include creel surveys, charter boat reports, an angler diary program, the Master Angler program, and commercial fishery records, as well as fisheries research studies. Some of the highlights described in detail include:

- Lake Erie yellow perch abundance has been steady in recent years, whereas walleye abundance has been more variable. Walleye experienced very good reproduction in 1999 and 2003, but very poor or below average reproduction in 1998, 2000, 2002, and 2004.
- Non-charter angler harvest rates for Lake Erie walleye declined, but yellow perch harvest rates improved. Angler effort decreased to the lowest level since 1995.
- Michigan non-charter anglers on Lake Erie caught over 150,000 walleye, but only harvested 33,000. Most of the fish caught and released were sub-legal walleye from the strong 2003 year class.
- Charter boat catch rates for Lake Erie walleye were about three times higher than those estimated for non-charter anglers, while yellow perch charter boat catch rates were roughly double those estimated for non-charter anglers.
- Entries in the Master Angler Program clearly show that Lake St. Clair is the premier Michigan water for trophy muskellunge and smallmouth bass.
- Smallmouth bass abundance in the Lake St. Clair trap net survey declined in 2005, perhaps due to cool water temperatures during May. Trophy size channel catfish were again common in the trap nets.
- Long-term tagging studies on Lake Erie walleye stocks clearly illustrate the important contribution of Lake Erie walleye to the Great Lakes sport fishery of Southeast Michigan, from Port Huron to Toledo.
- Tagging studies of lake sturgeon in the connecting waters since 1997 have demonstrated that lake sturgeon routinely move between Lake St. Clair and the St. Clair River. Longer range movements between the St. Clair system and southern Lake Huron are also frequent.

Fishery Forecast for 2006

Annual variation in reproductive success of walleye and yellow perch can result in substantial year to year changes in the abundance of these species. Harvestable-size yellow perch abundance will be about the same as last year in Lake Erie and Lake St. Clair, with strong contributions from the 2003, 2001, 2000, and 1999 year classes. Although walleye abundance will decrease in 2006, the average size of walleye available for anglers will be larger. The 2003 year class will dominate the walleye fishery in the connecting waters and Lake Erie. As a result, Lake Erie and Detroit River walleye anglers will find it easier to catch legal size walleye this year. Muskie and bass numbers tend to remain more stable from year to year and both species should continue to provide excellent fishing opportunities in 2006, particularly in Lake St. Clair and the Detroit River. However, weather conditions can affect sport fishing success as much as fish abundance. Therefore it is difficult to predict fishing success. Water levels are forecasted to be slightly lower this year, thus shallow waters may continue to restrict angler access to some fishing areas in the connecting waters.

Sport Fishery Summary

An on-site creel survey conducted by the Michigan Department of Natural Resources (MDNR) produced a total harvest estimate of 211,855 fish (Table 1) for Michigan's 2005 Lake Erie sport fishery (non-charter). In combination, walleye and yellow perch accounted for 93% of the total harvest, illustrating their importance in the sport fishery. Estimated angler effort in 2005 decreased to the lowest level observed since 1995 (Figure 1). The walleye harvest rate declined to the lowest level observed since 1986 (Figure 2). However, this was largely a result of the 15” minimum size limit which forced anglers to release many of the walleyes they caught (Table 2). The yellow perch harvest rate increased slightly in 2005 (Figure 2). Trends in angler effort and harvest rates for walleye and yellow perch since the mid-1980’s suggest that the level of angler effort on Lake Erie is affected by many factors in addition to harvest catch rates. Other factors, including weather, prey fish abundance, fishing success on other Great Lakes waters, and regional economic conditions have likely contributed to the comparatively low level of fishing effort since 1991.

Biological data were collected from walleye and yellow perch during the 2005 on-site creel survey. The walleye harvest was dominated by the 2001 year class (age 4), which represented 48% of the harvest (Figure 3). The 1999 year class also made a substantial contribution to the fishery as age 6 fish, accounting for 22% of the harvest. The 2003 year class (age 2) accounted for 17% of the harvest, but many 2003 fish were caught and released because they were under the legal 15" minimum size limit. Harvested age 2, 4, and 6 walleye averaged 389 mm (15.3 in.), 465 mm (18.3 in.), and 523 mm (20.6 in.) in total length. The overall average length of walleye harvested in the sport fishery in 2005 was 478 mm (18.7 in.).

Yellow perch harvest was dominated by age 2 fish (2003 year-class), which accounted for 44% of the total harvest (Figure 3). In combination, age 4 5, and 6 fish contributed an additional 47% of the total harvest. Average lengths of harvested age 2, 4, 5, and 6 yellow perch were 207 mm (8.2 in.), 231 mm (9.1 in.), 233 mm (9.2 in.), and 236 mm (9.3 in.), respectively. The overall average length of yellow perch harvested in the sport fishery in 2005 was 220 mm (8.6 in.). The observed mean length at age for yellow perch taken in the Michigan sport fishery improved slightly for all ages in 2005 (Figure 4).

Since 1989, Michigan charter boat operators have been required to report their charter fishing harvest and effort to the MDNR. In 2005, Michigan charter boat anglers harvested 20,694 fish from Lake Erie (Table 3). Yellow perch (70%) and walleye (29%) were the major species harvested, accounting for 99% of the harvest. The walleye harvest rate in 2005 was the lowest recorded since the reporting system was established (Figure 5). In contrast, the yellow perch harvest rate increased and was the third highest observed since 1990. The charter boat walleye harvest rate was more than three times higher than those estimated for non-charter anglers in 2005, while the yellow perch charter harvest rate was less than double the rate for non-charter boat anglers.

For the St. Clair-Detroit River system, charter boat anglers harvested 8,649 fish (Table 4). Yellow perch (50%), walleye (35%), and "other" species (15%), made up the bulk of the harvest. The "other" species category is thought to consist mainly of smallmouth bass. Charter boat harvest rates for walleye were the highest recorded since 1990, while yellow perch harvest rates increased slightly (Figure 6). Over the last 10 years, the walleye charter harvest rate for Lake Erie has consistently been about 3 to 4 times higher than the St. Clair-Detroit River system rate. However, in 2005, the St. Clair charter harvest rate (0.4 walleye per hour) exceeded the Lake Erie charter harvest rate (0.3 walleye per hour). We attribute this change to the effects of the 15" minimum size limit on the waters of the Detroit River and Lake Erie and the small size of the dominant 2003 year class in 2005. Overall, the lower harvest rate typical for the St. Clair system is a reflection of much lower walleye densities in Lake St. Clair throughout this time period. The decline of the Thames River walleye population would likely be a contributing factor to lower walleye abundance in St. Clair-Detroit River system since 1990.

The number of reported charter excursions on Lake Erie declined slightly in 2005 (Figure 7) to the new record low for the time series. Although some of this decline may be attributed to the walleye season closure in April and May, much of the decline resulted from lower numbers of excursions reported in June, July, and August. This could reflect a shift by the Michigan charter boat fleet to fishing grounds in Ohio waters of Lake Erie. Michigan charter boat operators are not required to report their fishing in Ohio waters to the Michigan reporting program. Low catches of harvestable size walleyes for charter trips in Michigan waters of Lake Erie could have been another factor contributing to the low numbers of charter excursions. However, charter boat excursions on the St. Clair-Detroit River system also declined slightly in 2005. We suspect that wider regional factors such as the economy have also been a factor in the overall lower charter boat business on Lake Erie and the connecting waters the last two years.

Muskellunge catch rates derived from the Angler Diary Program on Lake St. Clair improved through the late 1980's and early 1990's and have remained fairly steady over the past 10 years (Figure 8). In our opinion the quality of the Lake St. Clair muskellunge fishery is also reflected in the MDNR's Master Angler Program. The total number of muskellunge from Lake St. Clair entered for Master Angler Awards in 2005 exceeded 50 fish for the ninth consecutive year (Figure 9). The number of fish over 30 pounds remained above the numbers recorded prior to 1992. We believe that factors contributing to the consistent high quality of this fishery include: 1) a positive response by the muskie population to

increased minimum size limits on both sides of the lake since the mid-1980's; 2) physical and biological changes in the lake such as clearer water and increased aquatic plant growth resulting in improved habitat for muskellunge; and, 3) increased voluntary catch and release fishing for muskies in Lake St. Clair by both sport and charter anglers. It is noteworthy that there has been no apparent decline in the quality of the muskie fishery since the presence of muskie pox was documented in the lake's muskie population in 2002.

Statistics from the Master Angler program also indicate that Lake St. Clair is the premier waterbody in the state for trophy smallmouth bass. Lake St. Clair accounted for 14% of all smallmouth bass entries in 2005 (catch/keep and catch/release programs combined). Since the early 1990's, both catch/keep and catch/release Master Angler smallmouth bass entries from Lake St. Clair have exhibited an increasing trend (Figure 10). Catch/release entries have outnumbered catch/keep entries for the last six years. The strong representation of Lake St. Clair smallmouth bass in the statewide Master Angler Program is likely a reflection of an abundance of trophy-size smallmouth bass in the lake, a high degree of angler effort targeting the species, and a strong catch-and-release ethic among smallmouth bass anglers.

Commercial Fishery Summary

In 2005, two Michigan commercial fishing licenses were active on Lake Erie. State-licensed commercial seine operations in the shallow embayments along Michigan's Lake Erie shoreline harvested 10 species of fish for a total of 536,375 pounds (Table 5). In combination, common carp (60%), buffalo (18%) and goldfish (15%) accounted for 93% of the total harvest by weight. The total value of the 2005 Lake Erie commercial harvest from Michigan waters was estimated at $164,067.

Summary of Netting Surveys

During most years since 1978, the Michigan waters of the western basin of Lake Erie have been monitored with spring trap net surveys. In 2005, total catch per net lift (CPUE) for all species combined was more than 50% less than the long-term mean (Table 6). CPUE for walleye and yellow perch were both the lowest values observed during the 28 year survey period. CPUE values for all other species were also below the long-term mean CPUE, except for smallmouth bass, white bass, and white perch. Smallmouth bass catch rates increased in the mid-90's and since then have held steady. This indicates increased abundance since the mid-90's, probably a result of improved habitat conditions for smallmouth bass in Michigan's waters of Lake Erie. Physical conditions during the survey period in 2005 included cool water temperatures with extremely clear water. On several occasions the trap nets were visible from the surface, while the net was sitting on the bottom. Clear water is not a normal condition during the spring trap net survey on Lake Erie. We suspect net avoidance was a factor in the low catch rates for many of the species commonly captured in the survey.

Since 1978, the MDNR has fished variable mesh multi-filament gill nets at two locations in western Lake Erie each fall, as part of the interagency yearling walleye assessment program. During 2005, four net lifts caught a total of 761 walleye. The total walleye catch-per-effort for the index sites (190.5) was the highest recorded since 1989 (Table 7). However, roughly 83% of the walleye caught were age 2 fish (2003 year class). The age 2 catch rate of 157.5 per net lift even surpassed the catch rates for the strong 1982 and 1986 cohorts as age 2 fish. Unfortunately, yearling walleye accounted for less than 2% of the total catch in 2005. In fact, the low yearling catch rate (3.8 per net lift) suggests walleye spawning success in Lake Erie was poor in 2004, similar to 2000, and 2002. While the abundant 2003 year class will provide good fishing opportunities for several years, the presence of three very weak year classes in the past 5 years will result in a short lived improvement in abundance.

The forage fish community of Lake St. Clair has been surveyed with bottom trawls each year since 1996 by the MDNR. A total of 11 trawl tows were conducted at the Anchor Bay index trawling site in 2005. The spring samples were dominated by spottail shiner and yellow perch (Table 8). The species with highest mean densities in the fall samples were mimic shiner, spottail shiner, and bluntnose minnow. Alewife catches have been low since 2003, likely a result of the alewife population crash in Lake Huron. Yellow perch age-specific catch rates from the trawl survey indicate highly variable recruitment in Lake St. Clair (Table 9). Yellow perch recruitment in 1994, 1998, and 2003 was strong, with total CPUE values for those year classes all over 900 fish per

tow. Alternatively, recruitment was poor from 1999 to 2002 (total CPUE values less than 300 fish per tow). Anglers will find the strength of the 2003 year class clearly illustrated by the number of yellow perch in the 6 to 8 inch size range in 2006.

In 2005, the MDNR surveyed the adult fish populations in Anchor Bay, Lake St. Clair with trap nets. Five trap nets were fished from May 11 to May 26. A total of 1,116 fish representing 20 species were captured during the survey. Rock bass were numerically dominant, accounting for 38% of the total (Figure 11). Other common species in the nets included walleye (17%), smallmouth bass (10%), channel catfish (8%), and northern pike (6%).

Ages were estimated for smallmouth bass and walleye based on interpretation of scale samples. Age composition for those species is presented in Figure 12. The dominant walleye year class was the 2003 year class (Age 2), accounting for 34% of the total catch. For smallmouth bass, the 2001 (22%), 1999 (24%) and 1998 (22%) year classes accounted for 68% of the total trap net catch. A total of 166 walleye and 97 smallmouth bass were tagged and released at the Anchor Bay trap net site in 2005.

Ages were estimated for northern pike and muskie caught in the Anchor Bay trap nets, based on interpretation of dorsal fin ray sections (Figure 13). For northern pike (n=46), 73% of the fish were 5 years old or younger. In contrast, for muskies (n=48), 58% of the fish were 10 years old or older. The oldest muskie sampled was 19 years old.

The trap net survey revealed an abundant population of channel catfish in Anchor Bay dominated by trophy size individuals. The average weight of channel catfish captured during the 2005 trap net survey was 7.9 pounds. Over 38% of the channel catfish exceeded the minimum size requirement (27 inches total length) for the MDNR Master Angler program. Anglers are discouraged from keeping large channel catfish for food due to consumption advisories as a result of PCB contamination. However, catch-and-release trophy channel catfish angling opportunities are clearly available in Anchor Bay during the spring. The high abundance of large channel catfish suggests that this population is currently experiencing low exploitation.

A total of 238 lake sturgeon were collected during assessment surveys on Lake St. Clair and the St. Clair River in 2005. Sturgeon captured averaged 44.2 inches in total length, with a range from 10 inches to 68 inches. Ages were estimated for 215 sturgeon based on pectoral fin ray sections. Forty-five year-classes were represented with ages ranging from 0 to 53 years. Combined age samples from 1997-2005 indicate that survival of lake sturgeon spawned in the 1970's and 1980's has been fairly consistent, but lake sturgeon spawned in the 1950's and 60's are much less abundant (Figure 14). This may be a result of improved water quality after the Clean Water Act of 1972. More conservative lake sturgeon sport fishing regulations implemented in 1983 by Michigan could also be a factor in the increased survival

Fish Tagging Studies

In 2005, a total of 10,569 walleye were tagged with non-reward tags by Ontario, Ohio, New York, and Michigan at nine Lake Erie and Lake St. Clair sites. A total of 230 non-reward tags placed on fish in 2005 were recovered by fishermen for a single season reporting rate of 2.2%. The 2005 site-specific reporting rate varied from a high of 4.5% at the Huron River site, to a low of 1.3% for the Chicken and Hen Island site in Ontario and the Sandusky Bay site in Ohio. Compared with recent years, tag reporting rates were low in 2005. We suspect this may be due in part to recruitment of the abundant 2003 year class to the fishery. Most tagging projects sample mature spawning walleye, so relatively few of the young fish in the 2003 year class were tagged and at large in 2005. In general, the interagency tagging study continues to provide evidence of substantial movement of walleye from spawning locations in Lake Erie through the St. Clair connecting waters (Figure 15).

Legal size walleye (166 fish) and smallmouth bass (99 fish) captured in survey trap nets in Anchor Bay during May and June, 2005 were tagged and released. A total of 6 walleye and 1 smallmouth bass tagged in 2005 were recovered by anglers and reported to MDNR. A map showing the geographical distribution of walleye tag recoveries in 2005 for walleye tagged in Anchor Bay is presented in Figure 16. On average, recaptured walleyes tagged prior to 2005 had traveled 23.2 km from the Anchor Bay tag site, while those tagged in 2005 had traveled 12.3 km. The tagged

walleye recovered by anglers averaged slightly smaller in total length at tagging compared to the tagged population. This difference suggests that the largest individuals were either subject to slightly higher natural mortality or were less vulnerable to capture. The seasonal pattern of walleye tag recoveries differed between years. Recoveries for walleye tagged in 2005 were reported during May through July and came from Lake St. Clair and the St. Clair River. In contrast, recoveries in 2005 of walleye tagged in Anchor Bay in 2002-2004 were reported during June through October and were caught from Lake St. Clair and the St. Clair River. Overall, the pattern of tag recoveries of walleye tagged in Anchor Bay suggests a substantial annual migration of walleye from Lake Erie northward into and through the St. Clair system during the summer and returning to Lake Erie by the following spring.

There was a large difference in the tag reporting rate between walleye (3.6%) and smallmouth bass (1.0%). Some of this difference is likely due to higher angler exploitation for walleye. Recent creel surveys of Lake St. Clair documented that less than 10% of the legal smallmouth bass caught were harvested, while more than 90% of the legal walleye caught were harvested. The high proportion of catch-and-release fishing for bass may have accounted for a portion of the lower tag detection and/or reporting. Alternatively, tag loss rates or natural mortality rates for smallmouth bass tagged in Lake St. Clair may be much higher than for walleye.

A total of 1,624 lake sturgeon have been tagged and released on the St. Clair River and Lake St. Clair since 1996. To date, 100 tagged lake sturgeon have been recaptured. Forty-nine have been recovered with survey setlines in the North Channel. One was recovered in a survey trap net in Anchor Bay. Sixteen recoveries were reported by sport anglers, nearly all from the North Channel. Twenty recoveries have been reported from the Ontario commercial trap net fishery in southern Lake Huron, approximately 70 km from the tag site. All other recaptures have occurred within 10 km of the tag sites. Although trawling has accounted for the capture of 51% of the sturgeon tagged and released during this study, only seventeen recoveries (17%) have been fish originally caught in a trawl on Lake St. Clair. This may be an indication that fish residing year round in the St. Clair River, or moving north into southern Lake Huron, experience a higher level of fishing exploitation.

Water Levels

After nearly 30 years of above average water levels, anglers and boaters have experienced below average water levels in the connecting waters and Lake Erie during the last seven years. Water levels in the connecting waters are expected to be 2 to 4 inches lower in 2005 than last year, but will remain near the long term average. The effect of lower water levels on fish populations is uncertain. Short-term impacts may be negative. For example, northern pike spawning may be negatively impacted because coastal wetlands are dewatered. Bass spawning beds could also be more visible and more vulnerable to bass anglers. However, low water levels can result in recovery of lost coastal wetland areas. In Lake St. Clair, recovery of beds of emergent bulrush and wild rice is already apparent. Unfortunately, invasive common reed (*Phragmites australis)* has also expanded its distribution in the St. Clair Flats area during this period of low water. When water levels return to average or higher, increased coastal wetland habitat will positively impact many of the fish species in the connecting waters.

Sport Fishing Regulations

Walleye in Lake Erie are managed cooperatively with other jurisdictions under a harvest quota system. Reduced spawning success for walleye in Lake Erie resulted in lower adult walleye abundance in recent years. However, walleye abundance increased due to strong spawning success in 2003. As a result, walleye fishing is again open year-around for Michigan waters of Lake Erie. The daily bag limit remains at 5 fish, while the walleye minimum size limit is 15 inches.

Bass season regulations have been changed in Michigan for 2006. A new early catch-and-immediate-release (CIR) season has been added for the Michigan portion of the connecting waters (St. Clair River, Lake St. Clair, and Detroit River) and Lake Erie. The CIR season opens statewide the last Saturday in April and extends to the opening day for the harvest season. The open harvest season for smallmouth and largemouth bass fishing in the Michigan portion of the connecting waters is the third Saturday in June to December 31. The harvest season for the Michigan waters of Lake Erie opens on the Saturday before Memorial Day.

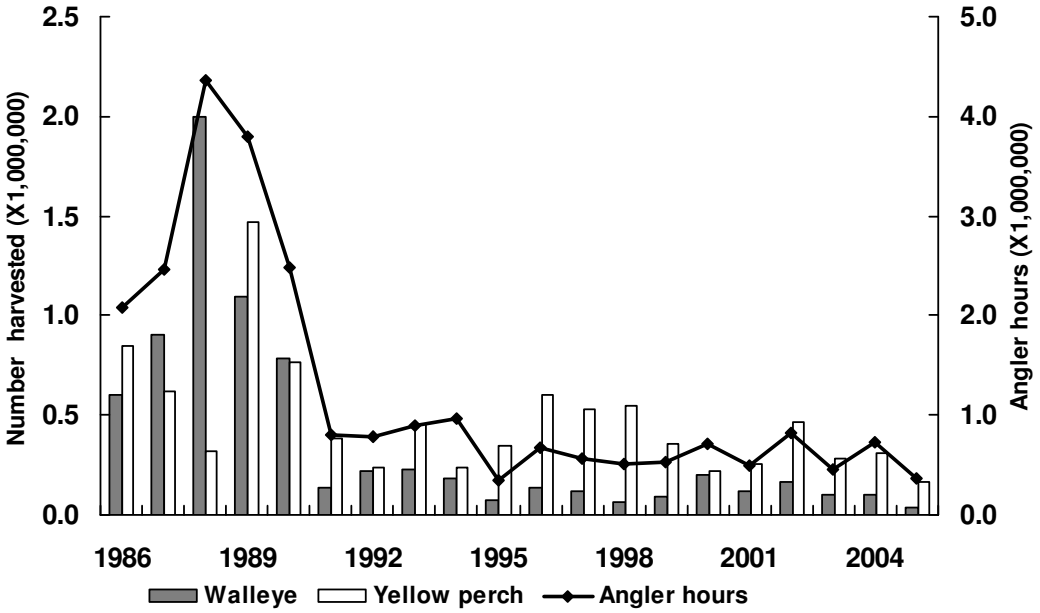


Figure 1.—Estimated harvest and effort for Michigan's Lake Erie sport fishery, 1986-2005.

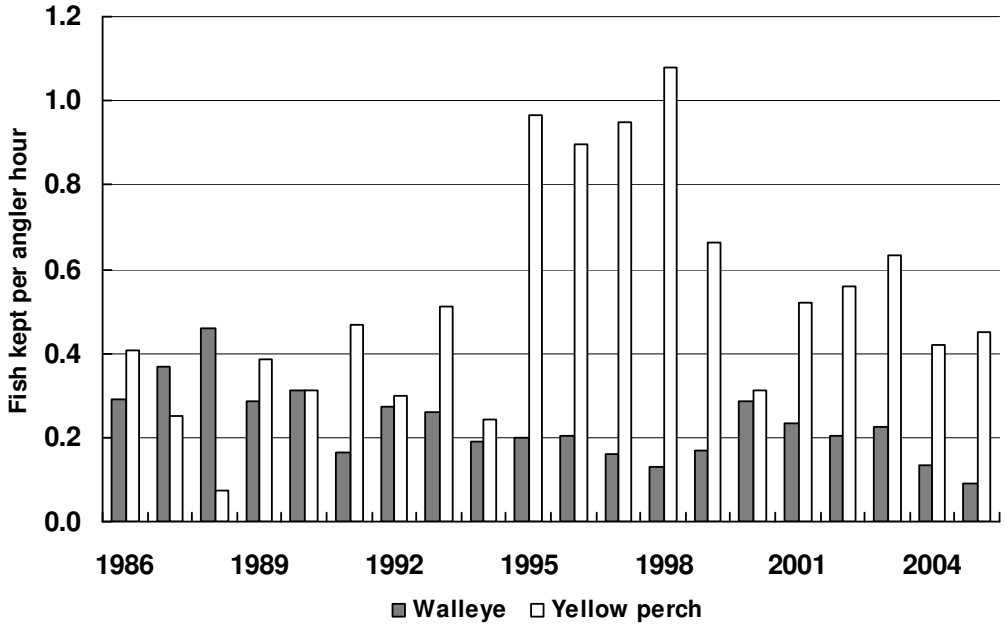


Figure 2.—Walleye and yellow perch harvest rates for Michigan's Lake Erie sport fishery, 1986-2005.

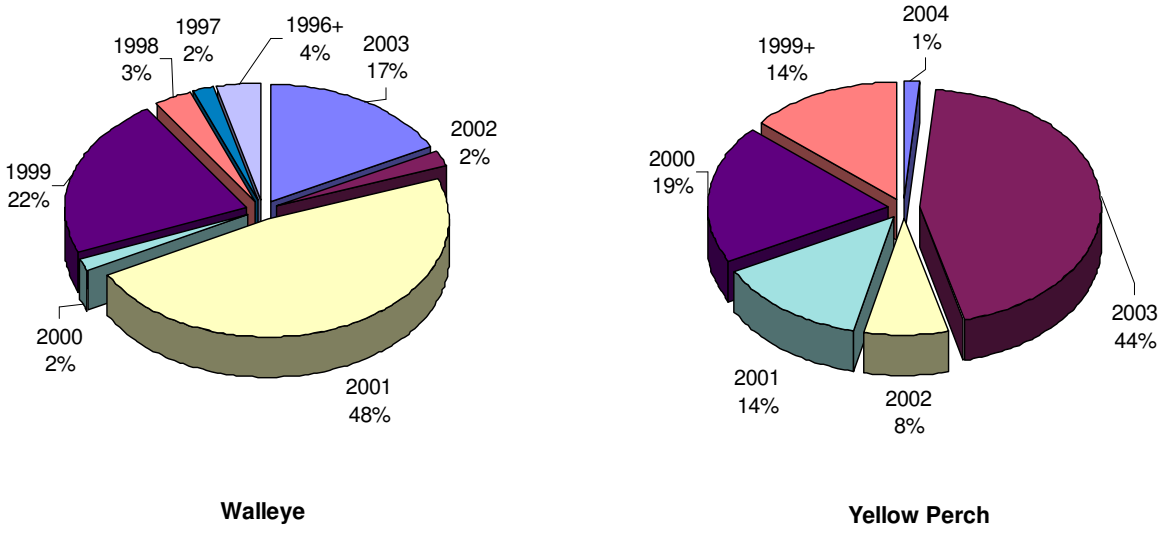


Figure 3. —Year-class contribution to Michigan sport harvest for walleye and yellow perch from Lake Erie in 2005.

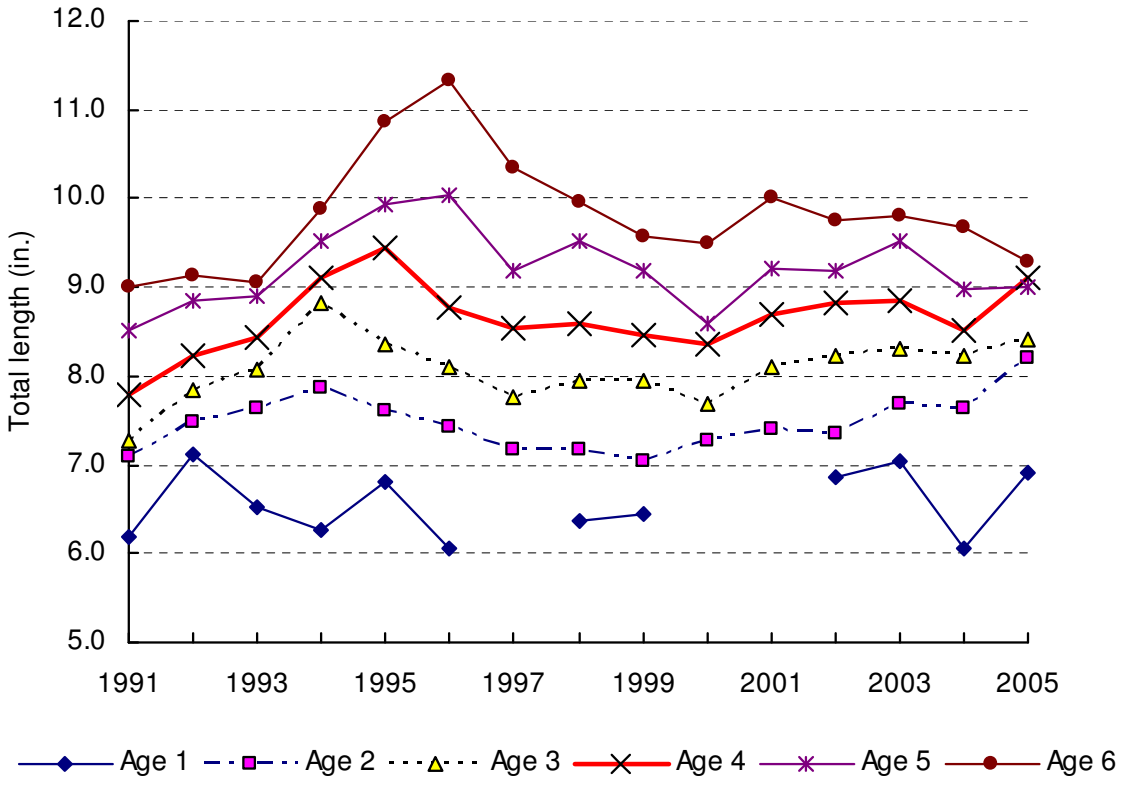


Figure 4. —Mean length at age for sport-harvested yellow perch from Michigan's waters of Lake Erie, 1991-2005.

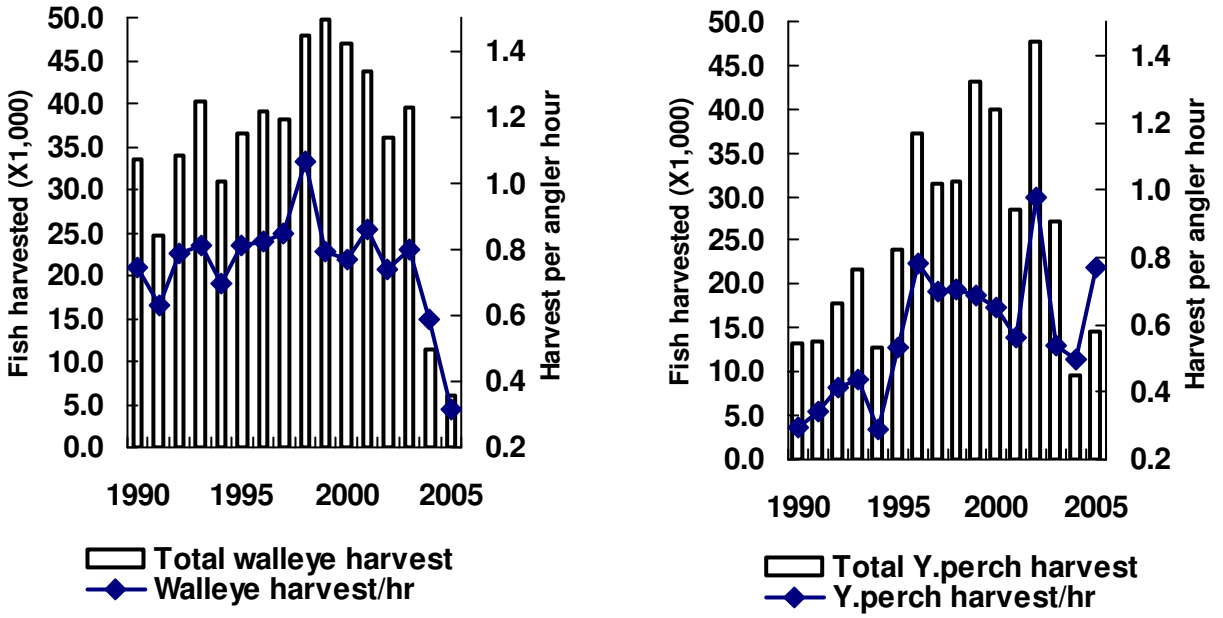


Figure 5. —Michigan charter boat harvest and harvest rates for Lake Erie, 1990-2005.

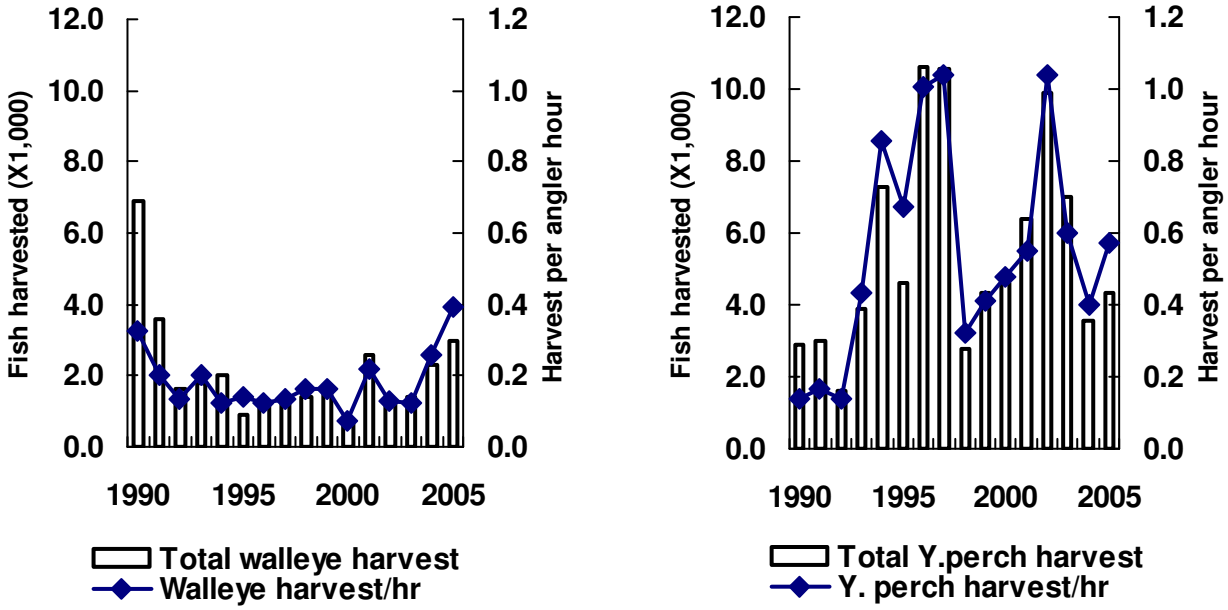


Figure 6. —Michigan charter boat harvest and harvest rates for the St. Clair-Detroit River system, 1990-2005.

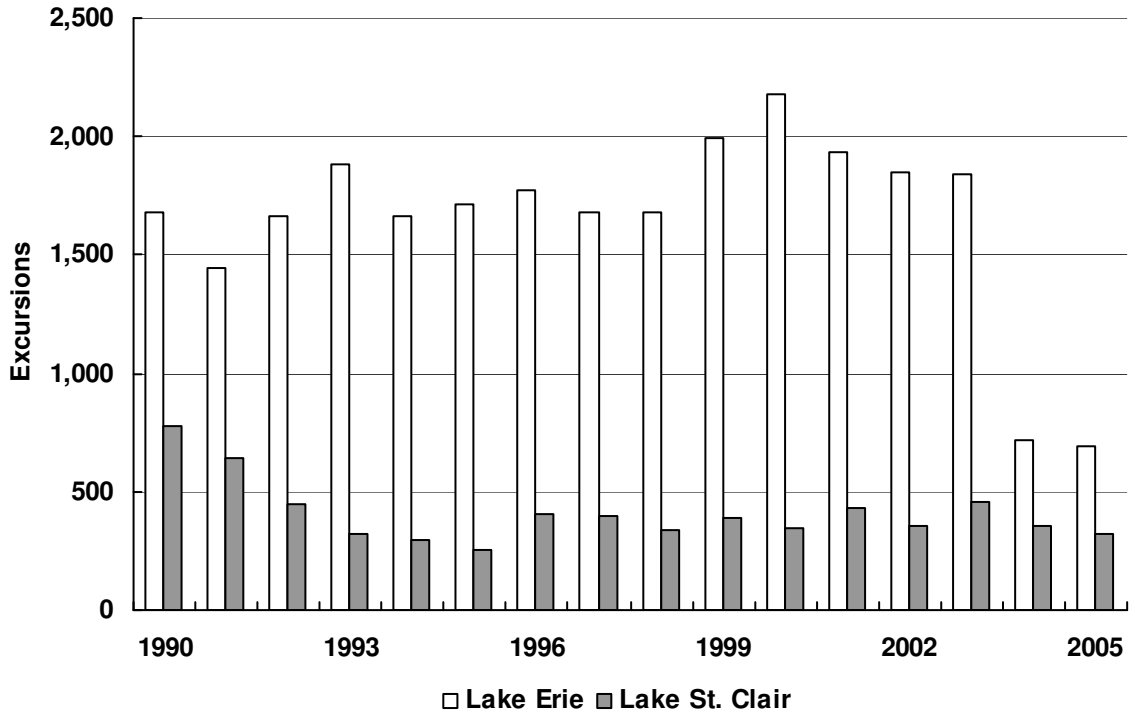


Figure 7. —Reported charter boat excursions on Lake Erie and the St. Clair-Detroit River system, 1990-2005.

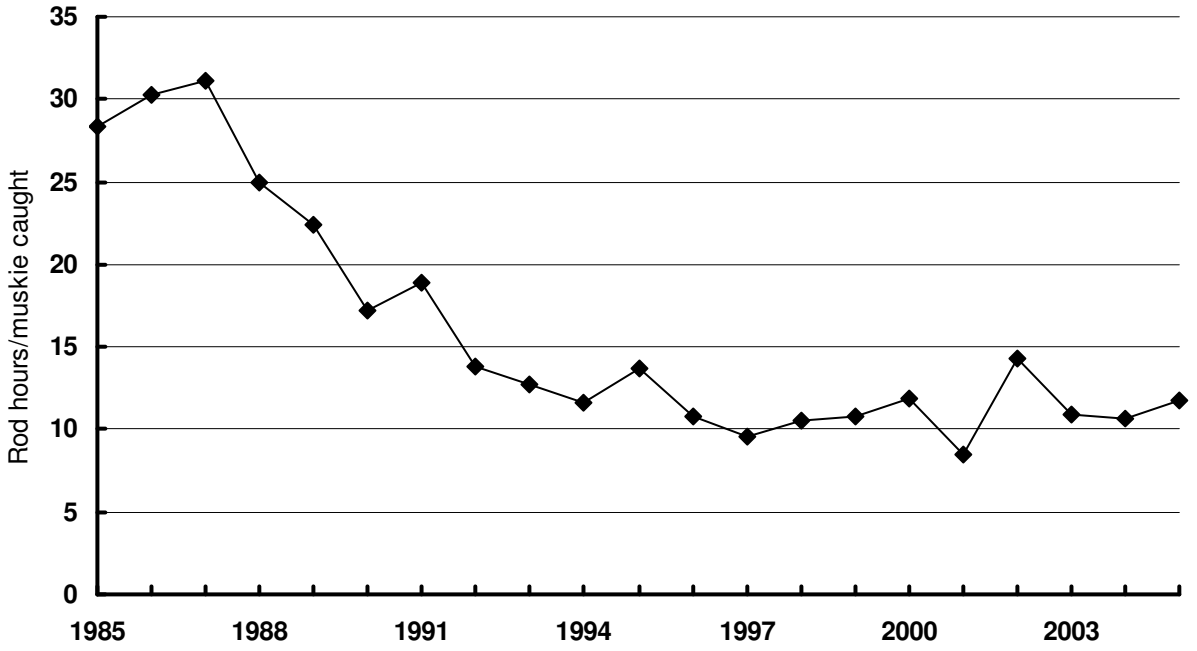


Figure 8. —Lake St. Clair muskellunge catch rate from Angler Diary Program, 1985-2005.

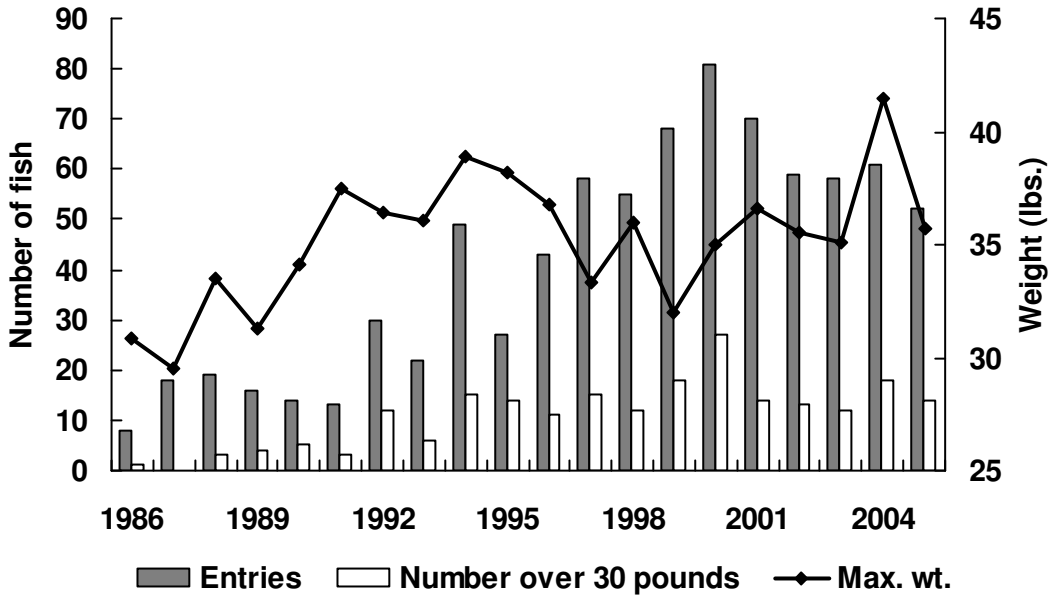


Figure 9. —Lake St. Clair muskellunge entered in the Michigan DNR Master Angler Program, 1986-2005. Values for 1992-2005 represent combined regular and catch-and-release Master Angler categories.

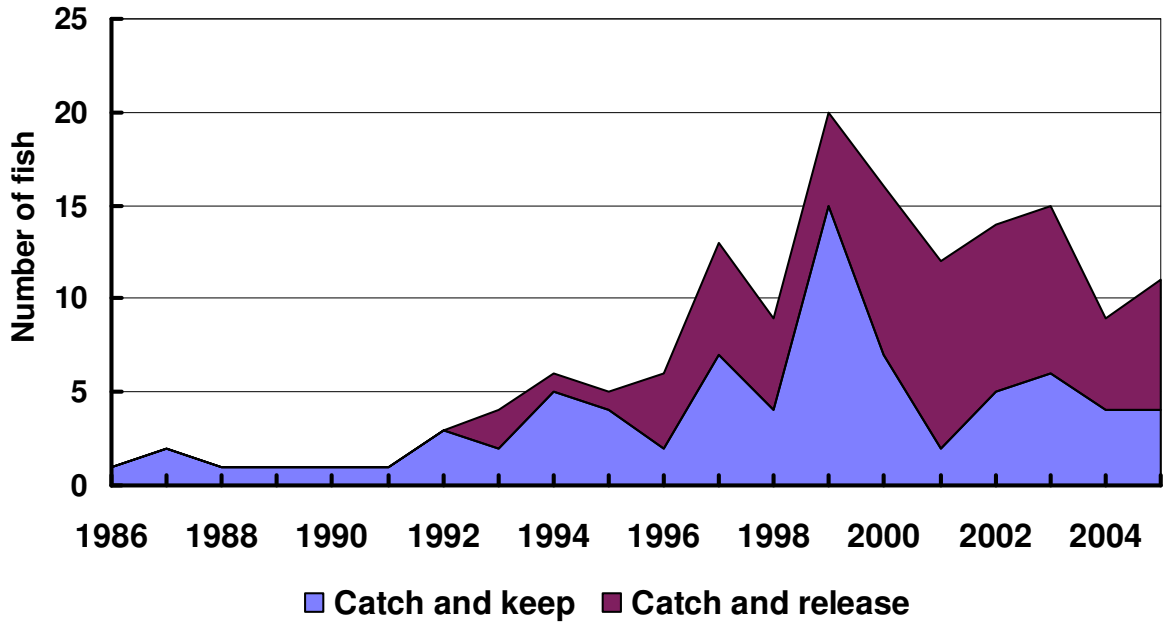


Figure 10. —Lake St. Clair smallmouth bass entered in the Michigan DNR Master Angler Program, 1986-2005.

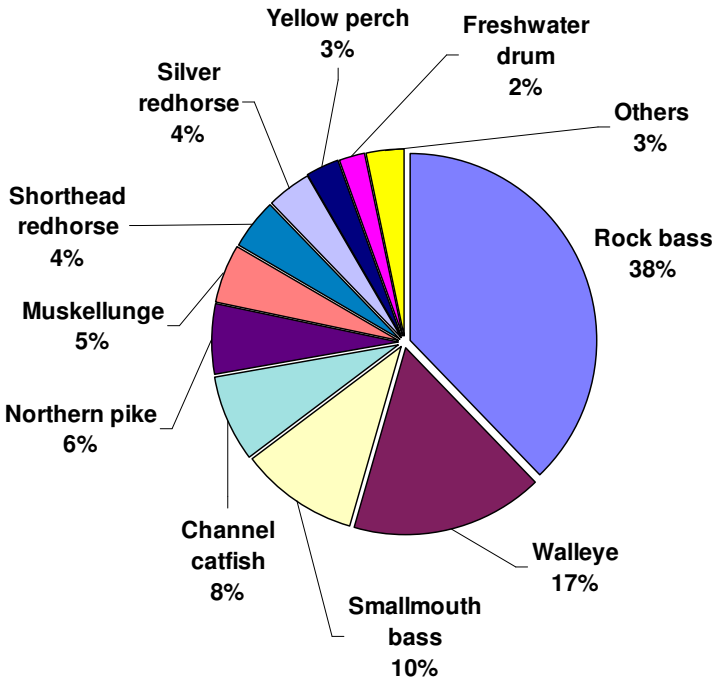


Figure 11. —Catch composition for trap nets fished in Lake St. Clair during May 2005.

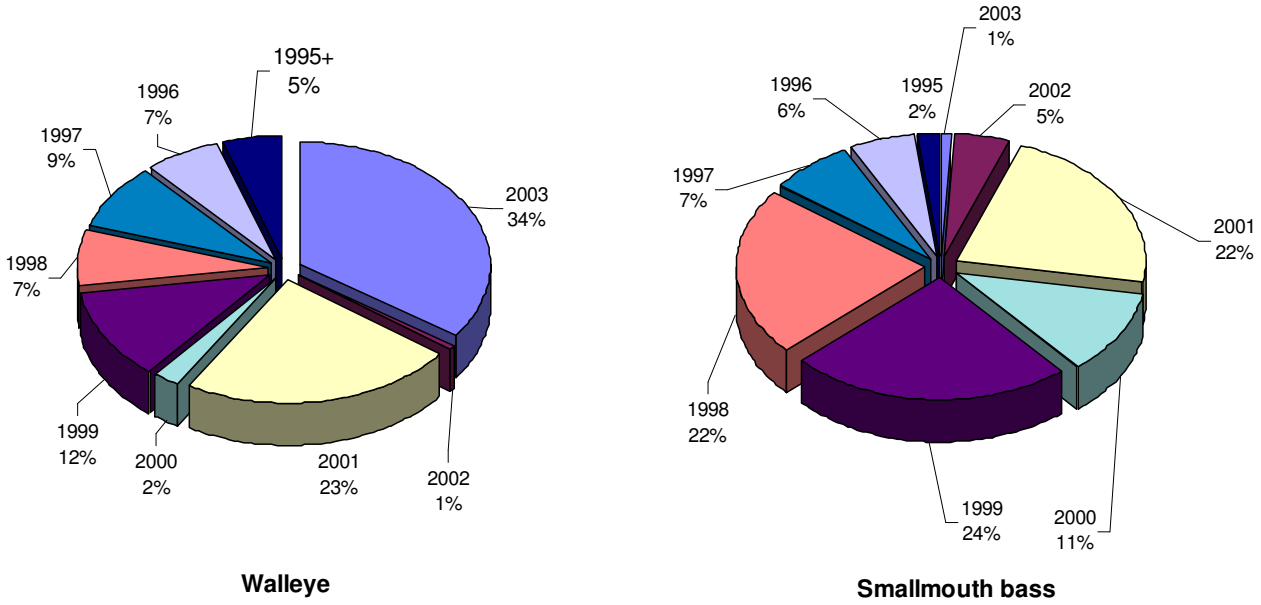
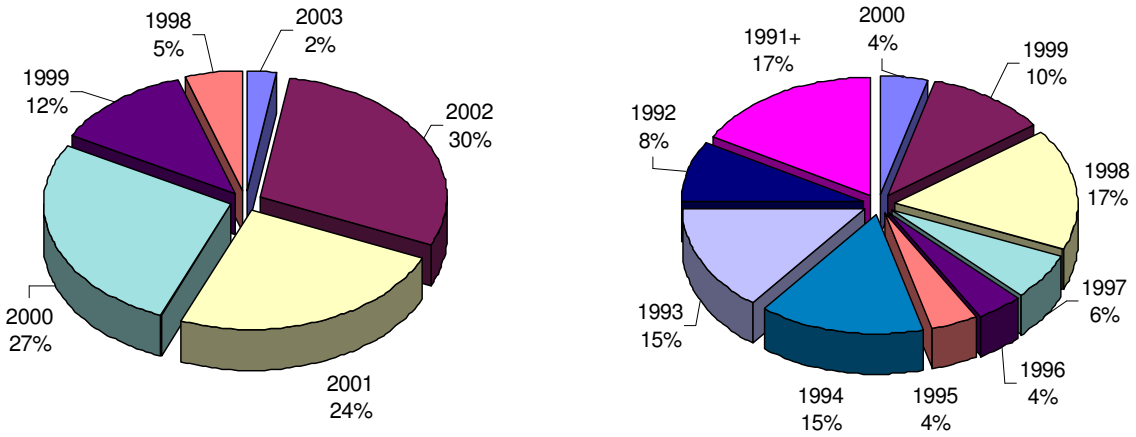


Figure 12. —Year-class contribution for walleye (n=184) and smallmouth bass (n=108) caught in Lake St. Clair trap nets in 2005.



Northern pike **Muskellunge**

Figure 13. —Year-class contribution for northern pike (n=46) and muskellunge (n=48) caught in Lake St. Clair trap nets in 2005.

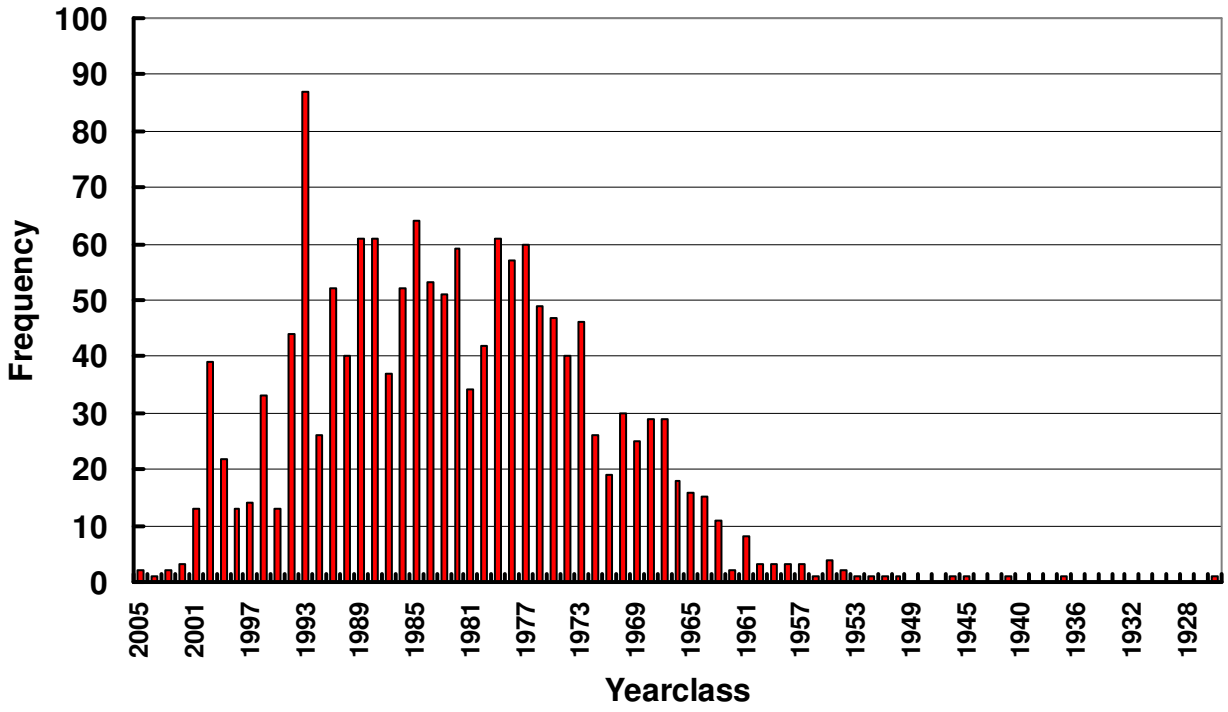


Figure 14. —Year of hatching for lake sturgeon sampled from Lake St. Clair and St. Clair River from 1997 to 2005 by Lake St. Clair Fisheries Research Station (n=1,529).

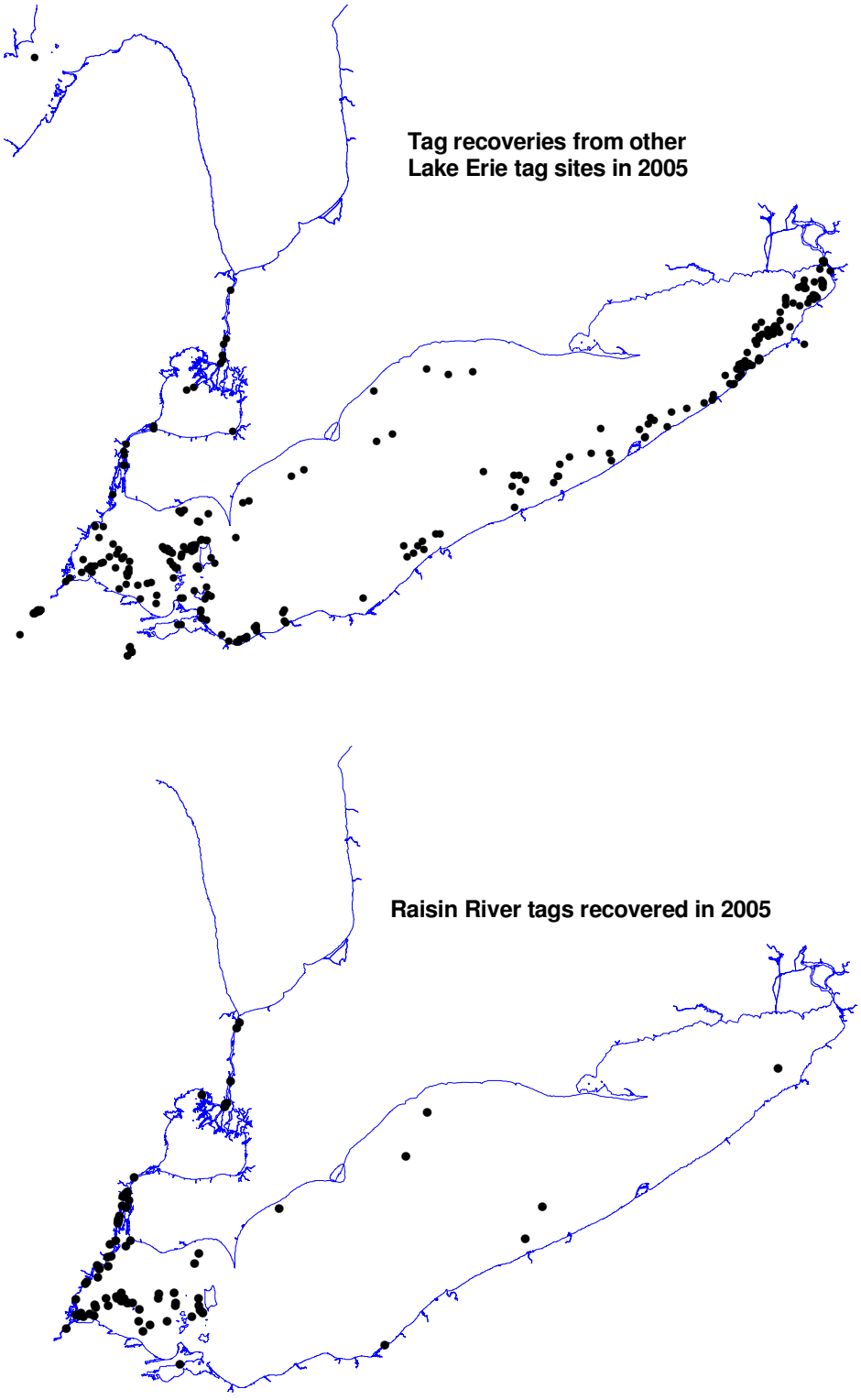


Figure 15.-Geographical distribution of walleye tag recoveries in 2005 from fish tagged during all years at Monroe (81 recoveries in 2005; bottom map) and other Lake Erie tag sites (282 recoveries in 2005; top map).

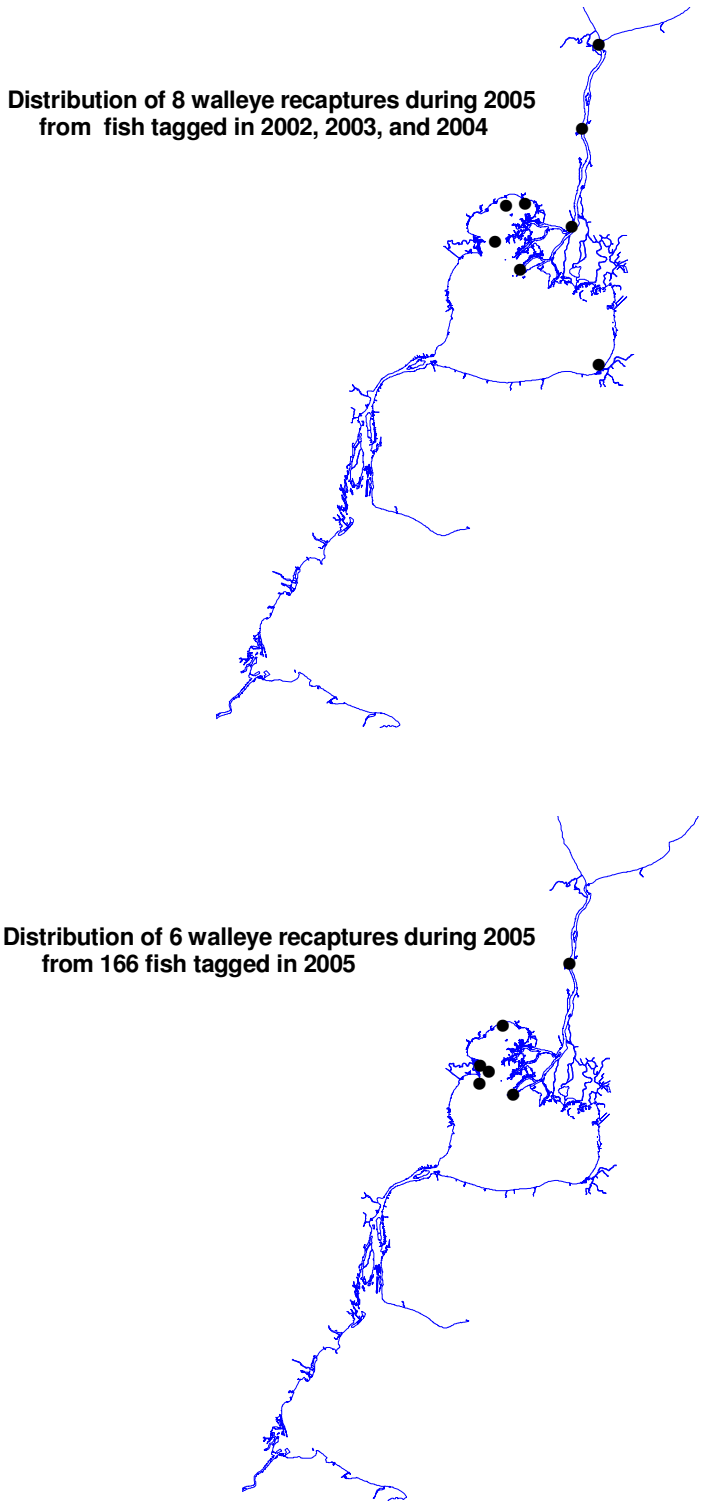


Figure 16.-Geographical distribution of walleye tag recoveries in 2005 from fish tagged during each year at the Anchor Bay site in Lake St. Clair.

Table 1.—Estimated sport harvest, harvest rate, and effort for Michigan's Lake Erie non-charter boat fishery, 2005. Two standard errors in parentheses.

Species	Harvest per hour	Month Apr	May	Jun	Jul	Aug	Sep	Oct	Season
Yellow perch	0.4500 (0.1810)	0 (0)	8,044 (13,300)	7,135 (16,153)	10,429 (14,786)	48,378 (37,234)	68,892 (38,793)	19,561 (18,766)	162,439 (62,449)
Walleye	0.0925 (0.0336)	0 (0)	96 (478)	8,863 (5,535)	18,887 (9,127)	1,827 (1,806)	2,253 (2,634)	1,480 (2,723)	33,407 (11,480)
White perch	0.0145 (0.0186)	0 (0)	824 (2,600)	316 (1,138)	1,184 (3,742)	1,289 (3,600)	518 (1,464)	1,117 (2,778)	5,249 (6,699)
White bass	0.0137 (0.0242)	206 (1,991)	1,794 (4,427)	1,521 (6,879)	816 (1,803)	122 (413)	282 (1,019)	201 (679)	4,943 (8,706)
Channel catfish	0.0082 (0.0179)	75 (685)	549 (1,392)	992 (5,297)	727 (3,566)	602 (3,418)	285 (793)	672 (3,100)	3,902 (8,069)
Freshwater drum	0.0026 (0.0053)	0 (0)	259 (686)	71 (300)	479 (1,933)	133 (359)	96 (408)	77 (374)	1,114 (2,175)
Smallmouth bass	0.0008 (0.0018)	0 (0)	25 (105)	66 (348)	69 (271)	25 (108)	96 (417)	17 (114)	297 (636)
Rock bass	0.0003 (0.0011)	0 (0)	10 (74)	0 (0)	0 (0)	0 (0)	94 (377)	0 (0)	103 (384)
Bluegill	0.0003 (0.0015)	0 (0)	0 (0)	0 (0)	98 (563)	0 (0)	0 (0)	19 (89)	117 (570)
Largemouth bass	0.0001 (0.0008)	0 (0)	0 (0)	50 (305)	0 (0)	0 (0)	0 (0)	0 (0)	50 (305)
Rainbow trout	0.0001 (0.0003)	0 (0)	0 (0)	19 (91)	0 (0)	0 (0)	0 (0)	0 (0)	19 (91)
Black crappie	0.0001 (0.0002)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	19 (89)	19 (89)
Angler hours		5,558 (1,815)	16,330 (4,781)	73,661 (21,849)	136,878 (28,214)	53,312 (12,197)	53,173 (13,380)	27,003 (13,832)	365,915 (42,645)
Angler trips		1,790 (556)	4,680 (1,239)	14,884 (4,183)	26,845 (5,323)	11,635 (2,690)	11,082 (2,787)	5,915 (2,903)	76,830 (8,433)
Angler days		1,790 (556)	4,680 (1,239)	14,800 (4,156)	26,788 (5,306)	11,635 (2,690)	11,082 (2,787)	5,871 (2,899)	76,645 (8,407)

Table 2.—Estimated sport catch, catch rate, and targeted catch rate for selected species in Michigan's Lake Erie non-charter boat fishery, 2005. Catch includes both fish harvested and released. Two standard errors in parentheses.

Species	Catch	Catch per hour	Targeted catch per hour
Walleye	150,598 (53,150)	0.4172 (0.1552)	0.7005 (0.2826)
White bass	28,484 (17,192)	0.0789 (0.0485)	Not estimated
Largemouth bass	7,027 (12,652)	0.0195 (0.0351)	Not estimated
Smallmouth bass	3,030 (4,094)	0.0084 (0.0114)	Not estimated
Northern pike	35 (226)	0.0001 (0.0006)	Not estimated

Table 3. —Total harvest per hour, harvest per excursion, number harvested, and fishing effort (angler hours, trips, and charter excursions) for charter boats on Lake Erie, 2005.

Species	Total harvest per hour	Harvest per excursion	Month							Season
			Apr	May	Jun	Jul	Aug	Sep	Oct	
Chinook salmon	0.000	0.004	0	0	3	0	0	0	0	3
Yellow perch	0.769	21.032	0	635	544	214	5,467	5,885	1,851	14,596
Walleye	0.314	8.573	62	0	2,998	2,589	273	26	2	5,950
Other	0.008	0.209	0	25	20	6	70	24	0	145
Angler hours			120	148	7,965	5,853	2,336	2,091	464	18,977
Angler trips			20	30	1,414	1,021	424	393	90	3,392
Anglers										
Resident			16	24	1,291	830	373	360	64	2,958
Nonresident			4	6	123	191	51	33	26	434
Charter excursions			6	7	285	211	88	79	18	694

Table 4. —Total harvest per hour, harvest per excursion, number harvested, and fishing effort (angler hours, trips, and charter excursions) for St. Clair-Detroit system charter boats, 2005.

Species	Total harvest per hour	Harvest per excursion	Month							Season
			Apr	May	Jun	Jul	Aug	Sep	Oct+ Nov	
Chinook salmon	0.000	0.003	1	0	0	0	0	0	0	1
Yellow perch	0.570	13.552	0	134	123	222	736	536	2,572	4,323
Walleye	0.395	9.395	949	895	304	671	142	14	22	2,997
Other	0.175	4.163	0	2	426	289	465	144	2	1,328
Angler hours			2,025	1,437	879	1,174	1,067	496	502	7,580
Angler trips			292	230	130	186	172	84	90	1,184
Anglers										
Resident			240	210	118	182	164	84	90	1,088
Nonresident			52	20	12	4	8	0	0	96
Charter excursions			89	69	34	45	42	19	21	319

Table 5. —Commercial harvest from Michigan waters of Lake Erie in 2005.

	Carp	Buffalo	Goldfish	Channel catfish	Gizzard shad	Other[1]	Total
Harvest (lbs.)	319,700	96,621	78,333	15,657	14,910	11,154	536,375
% of total	60	18	15	3	3	2	100
Market value	$55,293	$59,784	$33,292	$9,388	$2,237	$4,074	$164,067

[1]Other category includes bullheads, suckers, quillback, white bass, and freshwater drum

Table 6. —Mean catch per trap net lift for species commonly taken during spring trap net surveys in Michigan waters of Lake Erie.

Species	Survey year													
	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Walleye	28.1	49.0	18.1	20.6	38.8	26.1	36.6	75.5	61.7	33.9	83.1	35.9	23.8	95.9
Smallmouth bass	0.1	0.0	0.0	0.1	0.2	0.1	0.1	0.1	0.1	0.0	0.1	0.3	0.1	0.2
Yellow perch	377.0	320.0	669.0	512.0	146.0	257.0	129.0	156.0	40.3	174.0	22.9	251.5	41.7	94.6
Rock bass	1.2	0.8	1.9	0.9	1.5	1.3	1.0	1.5	0.7	1.5	0.9	0.8	0.3	0.8
White bass	1.5	1.5	3.7	1.4	10.5	4.9	2.5	2.8	7.6	0.4	5.3	4.7	0.9	1.6
White perch	0.0	0.1	0.3	0.5	24.6	35.0	10.9	38.9	30.3	43.5	63.1	233.0	40.5	56.8
Pumpkinseed	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.0
Bluegill	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.2
Black crappie	0.2	0.0	0.2	0.0	0.1	0.0	0.1	0.1	0.2	0.2	0.4	0.2	0.0	0.0
Channel catfish	3.5	9.7	5.4	5.8	4.9	10.6	4.6	5.5	5.4	2.7	3.5	4.1	9.0	6.0
Brown bullhead	0.2	1.1	1.6	1.9	1.7	4.2	2.5	1.5	4.1	0.9	9.2	3.9	13.1	4.3
White sucker	7.8	8.3	7.9	12.2	8.7	6.7	10.2	33.0	10.2	7.0	6.7	2.8	4.3	13.5
Redhorse sp.	2.4	1.2	0.6	1.0	0.8	1.5	1.7	1.4	1.3	1.7	1.8	0.6	0.4	0.6
Freshwater drum	37.4	66.8	14.0	42.9	13.4	23.5	25.1	30.6	25.3	9.1	15.6	6.4	5.1	25.6
Common carp	5.1	26.1	4.7	8.2	6.9	14.9	3.5	2.0	1.9	0.6	6.0	0.6	2.3	2.3
Goldfish	4.8	2.4	0.3	0.4	0.4	2.5	0.6	0.2	0.1	0.0	0.2	0.1	0.1	0.1
Gizzard shad	4.4	4.7	2.3	3.9	17.8	28.4	18.1	17.4	2.7	2.3	15.9	0.3	2.3	0.0
Longnose gar	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bowfin	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Quillback	4.0	18.6	1.8	2.0	2.4	5.6	2.0	1.9	1.7	1.8	1.5	0.7	1.9	2.9
Stonecat	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1
Total	477.9	510.3	731.8	613.9	278.8	422.4	248.7	368.5	193.6	279.7	236.4	546.2	145.8	305.5
% yellow perch	78.9	62.7	91.4	83.4	52.4	60.8	51.9	42.3	20.8	62.2	9.7	46.0	28.6	31.0
% white perch	0.0	0.0	0.0	0.1	8.8	8.3	4.4	10.6	15.7	15.6	26.7	42.7	27.8	18.6
Net lifts	50	46	48	36	37	53	57	51	49	55	51	55	82	29

Table 6. —Continued.

Species	Survey year												78-89	90-99	78-02
	1992	1993	1994	1995[1]	1996	1997	1998	1999	2000	2002	2004	2005	Mean	Mean	Mean
Walleye	37.7	39.2	53.0	26.2	52.0	30.2	34.8	38.0	41.4	35.7	38.7	11.6	42.3	43.1	41.0
Smallmouth bass	0.1	0.2	0.8	2.2	2.1	1.2	1.9	1.9	2.2	1.2	3.3	2.2	0.1	1.1	0.8
Yellow perch	35.0	50.2	23.2	10.3	36.6	30.7	33.3	61.0	50.1	74.5	11.2	2.0	254.6	41.5	138.8
Rock bass	0.5	1.2	1.0	4.1	1.1	0.9	1.0	2.8	0.7	1.1	0.9	0.6	1.2	1.4	1.2
White bass	0.5	0.1	1.1	2.1	0.6	2.6	1.3	4.6	4.0	3.0	7.7	6.8	3.9	1.5	3.2
White perch	5.1	0.0	14.7	72.8	5.9	10.2	8.7	79.4	54.7	36.3	62.2	84.1	40.0	29.4	38.9
Pumpkinseed	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.0
Bluegill	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Black crappie	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1
Channel catfish	4.6	4.6	5.4	3.7	8.8	4.4	11.4	16.0	5.2	8.0	7.6	1.4	5.5	7.4	6.2
Brown bullhead	4.0	1.6	1.1	0.2	1.1	0.4	0.0	1.0	2.9	0.8	0.7	0.2	2.7	2.7	2.5
White sucker	14.6	9.0	5.8	7.4	14.0	4.7	15.0	6.0	5.8	6.3	4.3	1.6	10.1	9.4	9.0
Redhorse sp.	3.1	3.6	1.8	1.0	5.5	1.9	3.3	2.2	3.8	4.8	4.3	1.8	1.3	2.3	2.1
Freshwater drum	8.9	20.7	8.8	13.0	15.4	6.8	28.3	50.4	11.3	42.7	21.5	4.2	25.8	18.3	22.0
Common carp	1.3	1.4	3.7	2.9	8.2	0.6	3.1	8.0	12.2	1.6	7.6	1.6	6.7	3.4	5.3
Goldfish	0.1	0.0	4.4	0.1	0.5	0.1	0.0	0.1	0.0	0.0	0.1	0.2	1.0	0.5	0.7
Gizzard shad	0.6	0.3	0.3	1.7	0.3	0.0	0.0	0.2	2.4	0.1	0.0	0.2	9.9	0.6	4.9
Longnose gar	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bowfin	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Quillback	4.4	3.2	4.6	6.7	8.9	2.2	7.9	8.5	3.7	20.8	14.2	3.3	3.7	5.1	5.3
Stonecat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	120.5	135.2	129.6	155.2	161.2	96.9	150.0	280.3	200.4	237.0	184.4	121.7	409.0	167.8	281.9
% yellow perch	29.0	37.1	17.9	6.2	22.7	31.7	22.2	21.8	25.0	31.4	6.1	1.7	55.2	24.8	37.5
% white perch	4.2	0.0	11.3	46.9	3.6	10.5	5.8	28.3	27.3	15.3	33.7	69.1	11.1	15.7	16.8
Net lifts	55	40	45	39	45	57	44	45	51	81	38	42	49	48	50

[1]Sampling period delayed two weeks.

Table 7. —Walleye CPUE (number per net lift) in multi-filament gill nets during fall surveys on Michigan waters of Lake Erie.

Year Class	Total CPUE	Survey year																	
		1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1977	171.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
1978	61.6	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
1979	72.4	0.3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
1980	92.7	0.3	0.0	0.3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
1981	72.3	0.5	0.3	0.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
1982	306.2	5.3	7.5	3.5	0.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–
1983	34.6	3.5	1.8	1.8	2.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–
1984	147.7	3.5	8.0	8.3	2.0	0.5	0.3	0.5	–	–	–	–	–	–	–	–	–	–	–
1985	177.2	9.3	14.3	8.5	1.5	1.3	0.8	1.0	–	–	–	–	–	–	–	–	–	–	–
1986	297.5	30.3	90.3	43.5	19.5	11.0	3.8	2.0	0.3	–	–	–	–	–	–	–	–	–	–
1987	127.8	4.5	53.8	26.8	20.0	13.8	2.5	3.8	1.0	0.5	0.8	–	0.3	–	–	–	–	–	–
1988	125.0	–	61.5	35.8	9.3	7.3	4.5	4.5	0.5	0.8	0.8	–	–	–	–	–	–	–	–
1989	52.6	–	–	16.0	17.0	10.0	2.8	3.3	1.3	0.8	0.8	0.3	0.3	–	–	–	–	–	–
1990	136.4	–	–	–	54.5	48.0	13.0	16.5	1.5	1.3	1.3	0.0	0.3	–	–	–	–	–	–
1991	194.3	–	–	–	–	63.0	47.3	61.5	11.3	6.8	2.8	1.3	0.3	–	–	–	–	–	–
1992	17.0	–	–	–	–	–	2.0	7.3	2.0	0.3	1.5	2.3	1.0	0.3	–	–	–	0.3	–
1993	170.3	–	–	–	–	–	–	73.3	71.0	11.8	8.08	3.3	1.5	0.3	0.5	–	–	0.3	0.3
1994	131.8	–	–	–	–	–	–	–	63.3	43.0	14.0	4.8	2.8	1.8	0.8	–	–	0.8	0.5
1995	9.9	–	–	–	–	–	–	–	–	3.3	1.3	0.8	1.0	0.8	0.8	0.3	–	0.8	0.8
1996	180.0	–	–	–	–	–	–	–	–	–	37.5	84.3	30.5	13.3	9.8	1.8	1.0	1.5	0.3
1997	133.0	–	–	–	–	–	–	–	–	–	–	54.3	34.3	20.3	15.3	3.0	1.0	3.8	1.0
1998	82.4	–	–	–	–	–	–	–	–	–	–	–	26.0	29.5	14.8	6.3	1.0	3.8	1.0
1999	177.4	–	–	–	–	–	–	–	–	–	–	–	–	57.0	73.3	21.5	5.8	13.0	6.8
2000	19.6	–	–	–	–	–	–	–	–	–	–	–	–	–	6.5	6.3	0.8	4.0	2.0
2001	129.1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	42.8	32.5	43.8	10.0
2002	11.3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.8	4.0	6.5
2003	238.7	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	81.2	157.5
2004	3.8																		3.8
Total		57.5	237.5	144.5	126.3	154.9	77.0	173.7	152.2	68.6	68.8	151.4	98.3	123.3	121.8	82.0	42.9	157.3	190.5
Net lifts		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

Table 8.– Mean density (number per hectare) for all fish species caught during spring (June) and fall (September or October) with 10 m headrope index trawls in Anchor Bay, Lake St. Clair.

	Spring								Fall							
	1998	1999	2000	2001	2002	2003	2004	2005	1998	1999	2000	2001	2002	2003	2004	2005
Alewife	3	2	4	3	3	0	0	0	12	2	3	32	0	0	0	1
Bluntnose minnow	0	0	11	10	7	1	6	118	0	9	15	54	33	13	43	238
Common carp	0	0	0	0	0	0	1	0	0	0	0	1	2	0	0	1
Emerald shiner	0	0	5	0	11	0	2	0	8	0	0	0	1	0	41	36
Freshwater drum	5	2	1	5	1	4	3	6	0	1	1	2	0	1	5	2
Johnny darter	7	0	0	0	0	0	3	2	0	0	0	0	0	7	0	0
Lake sturgeon	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0
Largemouth bass	0	0	0	1	0	0	0	0	0	3	2	16	36	13	13	29
Logperch	83	8	0	2	8	0	42	6	21	1	5	18	6	14	38	113
Mimic shiner	2	0	14	20	362	0	118	45	0	30	15	10	44	507	8,909	3,072
Muskellunge	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0
Northern pike	0	0	0	1	0	1	0	1	0	0	0	1	1	1	0	0
Shorthead redhorse	1	7	3	4	7	4	2	6	0	0	1	2	0	0	0	1
Pumpkinseed	0	0	0	2	0	0	0	0	0	2	0	5	5	3	1	0
Quillback	0	0	0	0	0	0	0	0	1	0	1	0	2	1	1	0
Rainbow smelt	4	4	4	61	0	14	53	11	0	0	1	0	0	4	26	0
Rock bass	5	1	13	30	39	18	5	10	1	89	93	40	41	35	25	77
Round goby	28	6	11	1	30	6	53	10	22	10	10	10	99	2	28	14
Silver lamprey	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0
Silver redhorse	0	0	1	0	2	5	2	1	1	0	0	1	6	0	4	5
Smallmouth bass	1	0	1	3	4	2	2	10	25	11	6	0	51	7	3	41
Spottail shiner	8	69	935	7	5,730	211	1,777	524	45	200	51	879	2,407	1,068	545	2,410
Trout-perch	99	154	34	11	265	13	108	65	26	3	0	0	10	6	59	3
Walleye	1	2	1	1	1	1	0	2	3	1	1	0	11	0	2	9
White perch	0	0	13	1	1	1	2	1	8	0	0	0	13	8	6	146
White sucker	4	0	3	1	61	2	68	22	0	0	1	1	8	1	1	4
Yellow perch	250	867	158	1,132	725	306	888	1,107	69	22	41	114	73	181	48	52

Table 9.–Catch rate by age for yellow perch in June index trawl tows on Lake St. Clair.

Year	Total	Survey year											
class	CPUE	1994[1]	1995[1]	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1984	0.5	0.1	0.3	–	–	–	–	–	–	–	–	–	
1985	0.2	0.2	0.0	–	–	–	–	–	–	–	–	–	
1986	0.3	0.1	0.0	–	–	–	–	–	–	–	–	–	
1987	1.0	0.6	0.3	0.1	–	–	–	–	–	–	–	–	
1988	4.1	1.6	0.9	0.3	0.3	–	–	–	–	–	–	–	
1989	10.2	3.7	2.2	1.2	0.3	–	–	–	–	–	–	–	
1990	30.1	4.1	13.4	5.2	1.3	–	–	–	–	–	–	–	
1991	167.9	47.0	32.1	18.7	12.9	5.3	0.6	–	–	–	–	–	
1992	52.1	3.4	5.8	11.5	9.6	18.4	1.1	0.1	0.5	–	0.7	–	
1993	581.3	56.3	125.8	171.4	113.7	53.7	54.3	1.5	3.3	–	1.3	–	
1994	903.0	–	166.2	293.2	348.2	53.2	20.6	8.3	10.6	1.3	0.7	–	0.7
1995	148.1	–	–	21.4	40.7	6.7	32.2	12.3	21.1	10.4	2.7	0.6	0.0
1996	279.7	–	–	–	33.3	108.5	70.3	11.3	35.3	9.7	9.4	0.6	1.3
1997	216.9	–	–	–	–	3.8	37.6	5.5	52.8	61.3	44.4	3.6	7.9
1998	1,354.5	–	–	–	–	–	650.2	114.1	347.7	83.7	118.4	22.7	17.7
1999	99.7	–	–	–	–	–	–	4.8	25.8	17.6	24.9	22.7	3.9
2000	76.2	–	–	–	–	–	–	–	2.7	4.6	5.4	43.0	20.5
2001	296.3	–	–	–	–	–	–	–	–	131.3	89.5	50.2	25.3
2002	26.2	–	–	–	–	–	–	–	–	–	8.7	11.4	6.1
2003	1,101.9	–	–	–	–	–	–	–	–	–	–	705.3	396.6
2004	9.0												9.0